Robots, the bizarre and the beautiful (Robot Special part 4)

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Anna Konda's smooth skin plate. Picture source: SINTEF

(PhysOrg.com) -- The future is a foreign country, and nowhere is it more foreign that the designs thrown up by a surge in robotics research. The feverish imagination and creativity of European robot scientists has led to dozens of robot designs, some bizarre, some beautiful, but all are inspired.

In Europe, as the rest of the world, there is a surge in robotics development, reflected in part by the European Network of Robotic Research (EURON), an EU-funded network of excellence that completed its work in 2008.

Robotic designs can take any shape or form and, given the rich and diverse imagination of European scientists and engineers, they often do. Designers take inspiration anywhere they can, from a bare approach that

stems from a desire for raw functionality to learning from the biological diversity of nature.

The robots attached to the EURON network (see related articles), for instance, reflect every conceivable type, from the bizarre, to the beautiful, to the truly inspired.

“Nature is a rich source of design ideas,” notes Bruno Siciliano, robotics researcher and dissemination officer for EURON. “Nature has already solved a lot of the problems that robotics researchers encounter, so it is a good place to go for ideas.”

Robot imitating life

Biomimetics, or mimicking biological systems, is a very popular approach in European robotics and has led to a host of unusual designs. Take, for example, the Robot Fish developed by researchers in the UK’s University of Essex. It looks like a real carp and is often mistaken for one.

The fish can move 20 inches a second and, at slower speeds, has a battery that will last five hours. The researchers built three fish as an attraction for the London Aquarium, where they have proved a very popular feature.

But ultimately the design could be used for seabed exploration, to study pipelines for leaks, or even be used for intelligence gathering. The fish can avoid obstacles and swim entirely independently. The researchers hope to increase the robot’s intelligence so that it can hook itself up to a power source when it is time for a recharge.

“Sure, it would be possible to design a standard submarine robot to do similar jobs, but by replicating the designs from nature, researchers can

use the advantages of that design. In the case of fish, they move through the water easily, without using much energy. As the design of robot fish improves, it will approach that level of efficiency."

Snakes and spiders

The Anna Konda is a snake-like robot that can also avoid obstacles and put out fires. The robot moves like a snake using hydraulics and is, the designers believe, both the biggest and strongest snake in the world, and the only one powered by hydraulics.

The advantage of the snake is that it can move through small spaces, it is extremely flexible and a comparatively simple design, though at 3 metres long and 70kg it deserves its moniker as the heftiest of all snakes. It was designed by SINTEF in Norway.

Spiders, too, have provided a rich seam of inspiration for researchers. The Fraunhofer Institute for Intelligent Analysis and Information Systems in Sankt Augustin has designed three, the Amos, Morpheus and TED.

The systems are designed as experimental platforms for neural perception and networking, an essential element of multi-legged systems, but if these problems are solved, they open the prospect of highly mobile, stable robots that can traverse a wide variety of terrains – even stairs – without difficulty.

Games robots play

Robots offer the potential to create new gaming and entertainment platforms, too. One of the most successful commercial robots of all time – Sony's Aibo – was designed primarily for entertainment.

In the games domain, foozball (table football) has proved a popular choice among researchers. In each case, a robot controls one side of the game and the human player competes against the robot. It is more than just fun, though, because designing an effective robot foozball player demands very rapid processing and fast reaction motors. It is a profoundly difficult problem but, once solved, it can feed into the wider stream of robotics research.

Education toys like the Robota dolls – a family of mini humanoid robots – can engage in complex interaction with humans, involving speech, vision and body imitation. The Robota dolls have been around since 1997, but new prototypes are in constant development at the Ecole Polytechnique Federale de Lausanne in Switzerland.

Finally, a robot that looks perhaps oddest of all, the e-Puck, is a very small, disc-like robot platform designed to allow labs to conduct experiments. And, yes, it looks like a hockey puck.

e-Puck contains sound sensors, proximity sensors, a camera, Bluetooth communication and accelerometer; all in a tiny robot with the same volume as a computer mouse. It is an incredibly flexible platform.

There are many other robot designs under investigation in Europe, including a wide range of robotic vehicles, like cars and airplanes.

One thing is certain, the ceaseless imagination of engineers and scientists will continue to create bizarre and beautiful robotic entities.

Many of the robots mentioned in this article have received funding from various European programmes.

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